



10th Annual
Research
Conference
2018

Childhood personality, psychological traits and weight status over time

Emer Scott & Prof Orla Doyle,
University College Dublin



An Roinn Leanaí
agus Gnóthaí Óige
Department of Children
and Youth Affairs

Why childhood obesity matters

- Obesity is a major public health issue (650m globally) (WHO, 2017)
- Increased risk of ill health, mortality, reduced wellbeing (e.g. Eckel et al, 2018; Hubert et al, 1983; Must et al, 1999; Renehan et al, 2008)

Childhood obesity is particularly concerning:

Risk of
comorbidities
in childhood /
adolescence
(Halfon, Larson
& Slusser, 2013)

Majority
become
overweight /
obese adults
(e.g. Whitaker et
al, 1997)

Lifetime risk to
health, even if not
overweight as
adults (e.g. Ma et al,
2017; Freedman et al,
2001)

- Major rise in Ireland since 1975 (Abarca-Gomez et al, 2017)
- 1 in 5 Irish children is overweight/obese at age 7 (Bel-Serrat et al, 2017)



Why children become overweight/obese

- **Family factors** (e.g. socioeconomic, health behaviours, genetics) (e.g. Silventoinen et al, 2010; Nan et al, 2012; Rayfield & Plugge, 2017)
- **Social/environmental factors** (e.g. social norms, advertising, food availability, access to space to be active) (e.g. Wang & Lobstein, 2006; Schalkwijk et al, 2018)
- **Individual factors** (e.g. personal preferences, choices & behaviours)

Family and social / environmental factors are major influences on childhood obesity. Individual factors may become more important in older children...



Psychological traits & obesity risk

Psychological traits associated with health behaviours & obesity risk:

Lower self-esteem (e.g. Gatineau & Dent, 2011)

Mood disorders (e.g. McElroy et al, 2004)

Stigma / reduced mental wellbeing (e.g. Adams & Bukowski, 2008)

BUT direction of relationships uncertain. Less research with children

Personality traits associated with obesity risk include:

- Self-control & conscientiousness: protective influence
- Neuroticism, impulsivity, reward sensitivity: increased risk
- Mixed evidence on extraversion

(e.g. Gerlach, Herpertz & Loeber, 2015; Vainik et al, 2013; Sutin et al, 2011; Cheng & Furnham, 2013)



Research aims & hypotheses

Aims: Explore whether psychological traits associated with future weight status & identify factors associated with transition between weight categories

Hypotheses:

Children with more psychological problems at age 9:

Higher risk of obesity
/ overwgt at age 13

More likely to move
into higher weight
categories over time

Children from more disadvantaged backgrounds:

More likely to move into higher weight categories over time



Methods

- Secondary analysis of GUI Child Cohort Waves 1 & 2 (n=7,525)
- Excluded non-singletons (n=225)
- Excluded 3 cases where child gender varied between waves
- Final sample: n=7,295

Analysis

- Binomial logistic regressions
- $\alpha < 0.05$
- Average marginal effects (AME) calculated
- Nagelkerke pseudo-R² to assess goodness-of-fit
- R version 3.4.1 & RStudio



Outcome variables

Aim 1: probability of obesity/overweight at age 13

- Obese (1) & Non-obese (0)
- Overweight/obese (1) & Non-overweight (0)
- Based on measured height & weight
- IOTF thresholds (age & gender specific)

Aim 2: probability of transition between wgt categories

- Transition into higher category (1) & Staying in same category (0)
- Transition into lower category (1) & Staying in same category (0)
- Excluded cases that could not have changed category

Predictor variables

Piers-Harris 2 Self-Concept

- Behaviour
- Intellectual & School
- Physical Appearance
- Freedom from Anxiety
- Popularity
- Happiness & Satisfaction

Strengths & Difficulties Questionnaire

- Emotional
- Conduct
- Hyperactivity / Inattention
- Peer-Relationship Problems
- Prosocial

PH: Child self-report

SDQ & EAS: Primary caregiver report

EAS Temperament Scale

- Shyness
- Emotionality
- Activity
- Sociability



Control variables

- Child gender
- Child birthweight (kg)
- Primary caregiver smoking in pregnancy (yes/no)
- Ever been breastfed (yes/no)
- Primary caregiver weight at W1 (obese/overwgt/non-overwgt)
- Primary caregiver education at W1 (4 categories)
- Equivalised household income quintile at W1
- Proportion of household income from social welfare at W1

Notes:

- Child ethnicity & onset of puberty could not be included
- Longitudinal weighting factor applied in all regressions



Do psychological factors predict obesity?

| | Baseline | Model 1 (PH) | Model 2 (SDQ) | Model 3 (EAS) | Model 4 (All) |
|------------------------------------|-----------|-----------------|------------------|------------------|------------------|
| PH Happiness & Satisfaction | | -0.005** | | | -0.005** |
| EAS Shyness | | | | -0.007* | -0.007* |
| EAS Sociability | | | | -0.007* | -0.008* |
| Child overwgt at 9 yrs | 0.070*** | 0.069*** | 0.071*** | 0.068*** | 0.068*** |
| Child obese at 9 yrs | 0.396*** | 0.398*** | 0.396*** | 0.381*** | 0.390*** |
| PCG smoked in pregnancy | 0.012* | 0.011* | 0.013* | 0.013** | 0.013* |
| PCG obese | 0.036*** | 0.034*** | 0.036*** | 0.035*** | 0.031*** |
| PCG education – higher & upper sec | -0.026*** | -0.029*** | -0.026*** | -0.025*** | -0.028*** |
| PCG education – non-degree | -0.021** | -0.025** | -0.021** | -0.019* | -0.023** |
| PCG education degree/postgrad | -0.018 | -0.021* | -0.018* | -0.016 | -0.017 |
| Household income quintile | -0.004* | -0.003 | -0.004* | -0.005* | -0.004 |
| N | 5,815 | 5,465 | 5,796 | 5,783 | 5,419 |
| Nagelkerke pseudo-R ² | 0.599 | 0.643 | 0.601 | 0.615 | 0.661 |



Do psychological factors predict obesity/overweight?

| | Baseline | Model 1 (PH) | Model 2 (SDQ) | Model 3 (EAS) | Model 4 (All) |
|----------------------------------|----------|-----------------|------------------|------------------|------------------|
| PH Popularity | | -0.006* | | | -0.005 |
| SDQ Peer-Relationship | | | 0.008* | | 0.004 |
| Female child | 0.015 | 0.022* | 0.013 | 0.015 | 0.020* |
| Child overwgt at 9 yrs | 0.500*** | 0.497*** | 0.498*** | 0.496*** | 0.496*** |
| Child obese at 9 yrs | 0.807*** | 0.805*** | 0.806*** | 0.803*** | 0.805*** |
| PCG smoked in pregnancy | 0.056*** | 0.055*** | 0.057*** | 0.058**** | 0.057*** |
| Child was breastfed | 0.020* | 0.022* | 0.021* | 0.018 | 0.019* |
| PCG overweight | 0.042*** | 0.041*** | 0.039*** | 0.041*** | 0.037*** |
| PCG obese | 0.057*** | 0.061*** | 0.053*** | 0.057*** | 0.058*** |
| PCG education – non-degree | -0.031* | -0.034* | -0.030* | -0.031* | -0.032* |
| PCG education degree/postgrad | -0.043** | -0.048** | -0.040* | -0.042** | -0.044** |
| N | 5,815 | 5,465 | 5,796 | 5,783 | 5,419 |
| Nagelkerke pseudo-R ² | 0.643 | 0.688 | 0.648 | 0.650 | 0.698 |



Do psychological factors predict transition into higher weight categories?

| | Baseline | Model 1 (PH) | Model 2 (SDQ) | Model 3 (EAS) | Model 4 (All) |
|------------------------------------|----------|-----------------|------------------|------------------|------------------|
| PH Happiness & Satisfaction | | -0.008* | | | -0.007* |
| SDQ Peer-Relationship | | | 0.011*** | | 0.007* |
| EAS Shyness | | | | -0.015** | -0.018** |
| EAS Activity | | | | -0.014* | -0.012* |
| EAS Sociability | | | | -0.016* | -0.013 |
| Child overwgt at 9 yrs | 0.037*** | 0.038*** | 0.035*** | 0.030** | 0.032** |
| PCG smoked in preg | 0.042*** | 0.045*** | 0.040*** | 0.043*** | 0.045*** |
| PCG overweight | 0.021* | 0.022* | 0.022* | 0.020* | 0.022* |
| PCG obese | 0.059*** | 0.062*** | 0.056*** | 0.058*** | 0.060*** |
| PCG education – higher & upper sec | -0.026* | -0.033** | -0.026* | -0.026* | -0.033** |
| PCG education – non-degree | -0.035* | -0.033* | -0.037** | -0.036* | -0.035* |
| PCG education degree/postgrad | -0.045** | -0.047** | -0.047** | -0.045** | -0.050** |
| Household income quintile | -0.008* | -0.006 | -0.007 | -0.009* | -0.006 |
| N | 5,103 | 4,794 | 5,090 | 5,075 | 4,757 |
| Nagelkerke pseudo-R ² | 0.260 | 0.351 | 0.265 | 0.281 | 0.373 |



Do psychological factors predict transition into lower weight categories?

| | Baseline | Model 1 (PH) | Model 2 (SDQ) | Model 3 (EAS) | Model 4 (All) |
|--|-----------|-----------------|------------------|------------------|------------------|
| SDQ Emotional | | | -0.018* | | -0.027* |
| Female child | -0.058* | -0.077* | 0.049 | -0.056 | -0.069* |
| Child obese at 9 yrs | 0.104*** | 0.098** | 0.108*** | 0.104** | 0.097** |
| PCG smoked in preg | -0.107*** | -0.081* | -0.110*** | -0.110*** | -0.086* |
| PCG obese | -0.130*** | -0.117** | -0.122*** | -0.127*** | -0.108** |
| N | 1,278 | 1,205 | 1,269 | 1,273 | 1,193 |
| Nagelkerke pseudo-R² | 0.345 | 0.424 | 0.364 | 0.355 | 0.451 |

Summary of findings

Some psychological factors are associated with obesity and/or weight gain over time:

| | | |
|--|--|-------|
| Happiness & Satisfaction (PH) | Reduced probability of future obesity Reduced probability of upwards transition | Green |
| Popularity (PH) | Reduced probability of future overwgt/obesity (1 model) | Green |
| Shyness (EAS) | Reduced probability of future obesity Reduced probability of upwards transition | Green |
| Sociability (EAS) | Reduced probability of future obesity Reduced probability of upwards transition (1 model) | Green |
| Activity (EAS) | Reduced probability of upwards transition | Green |
| Peer-Relationship Problems (SDQ) | Increased probability of upwards transition Increased probability of future overwgt/obesity (1 model) | Red |
| Emotional Problems (SDQ) | Reduced probability of downwards transition | Red |

Summary of findings

However, much larger effects seen for control variables

Largest AMEs seen for previous weight, family health behaviours & PCG education level

Girls had incr prob of overwgt/obesity & reduced prob of downwards transition (in some models)

Birthweight, breastfeeding, income, social welfare: not significant in most cases

Family health behaviours significant both for weight gain & weight loss. Social advantage only significant in weight gain



Implications for policy / future research

- Psychological factors not major contributors **BUT** happiness & good peer relationships appear to be protective:
 - **Adds weight to policies supporting child mental health & wellbeing**
- Family health behaviours are significant in child obesity:
 - **Policymakers should support families to adopt healthier lifestyles in order to address child obesity**
- **More research is needed** to understand whether psychological factors become more important for obesity / weight transitions in adolescence & young adulthood



References

1. WHO (2017) 'Obesity & overweight', *WHO.int*
2. Eckel, N. et. al. (2018) 'Transition from metabolic healthy to unhealthy phenotypes and association with cardiovascular disease risk across BMI categories in 90,257 women (the Nurses' Health Study): 30 year follow-up from a prospective cohort study', *The Lancet Diabetes and Endocrinology*, 31 May
3. Hubert, H.B. et. al. (1983) 'Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants in the Framingham heart study', *Circulation*, 67(5), pp. 968-977
4. Must, A. et. al. (1999) 'The Disease Burden Associated With Overweight and Obesity', *JAMA*, 282(16), pp. 1523-1529
5. Renehan, A.G. et. al. (2008) 'Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies', *Lancet*, 16;371(9612), pp. 569-578
6. Gattineau M. and Dent, M. (2011) *Obesity and Mental Health*. Oxford: National Obesity Observatory
7. McElroy, S. et. al. (2004) 'Are Mood Disorders and Obesity Related? A Review for the Mental Health Professional', *Journal of Clinical Psychiatry*, 65(5), pp. 634-651



References

8. Halfon, N., Larson, K. and Slusser, W. (2013) 'Associations Between Obesity and Comorbid Mental Health, Developmental, and Physical Health Conditions in a Nationally Representative Sample of US Children Aged 10 to 17', *Academic Pediatrics*, 13, pp. 6-13
9. Simmonds, M., et al. (2016) 'Predicting adult obesity from childhood obesity: a systematic review and meta-analysis', *Obesity Reviews*, 17(2), pp. 95-107
10. Whitaker, R.C. et. al. (1997) 'Predicting obesity in young adulthood from childhood and parental obesity', *The New England Journal of Medicine*, 23(13), pp. 869-873
11. Freedman, D.S. et. al. (2001) 'Relationship of childhood obesity to coronary heart disease risk factors in adulthood: the Bogalusa Heart Study', *Pediatrics*, 108(3), pp. 712-718
12. Abarca-Gómez, L. et al. (2017) 'Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults', *The Lancet*, 390 (10113), pp.2627-2642
13. Bel-Serrat, S. et. al. (2017) *The Childhood Obesity Surveillance Initiative (COSI) in the Republic of Ireland: Findings from 2008, 2010, 2012 and 2015*. Dublin: Health Service Executive



References

14. UK Government (2007) *Reducing obesity: obesity system map*. London: Government Office for Science
15. Gataineau M. and Dent, M. (2011) *Obesity and Mental Health*. Oxford: National Obesity Observatory
16. McElroy, S. et. al. (2004) 'Are Mood Disorders and Obesity Related? A Review for the Mental Health Professional', *Journal of Clinical Psychiatry*, 65(5), pp. 634-651
17. Goodman, E. and Whitaker, R.C. (2002) 'A prospective study of the role of depression in the development and persistence of adolescent obesity', *Pediatrics*, 110(3), pp. 497-504
18. Lumeng, J.C. et. al. (2003) 'Association between clinically meaningful behavior problems and overweight in children', *Pediatrics*, 112(5), pp.1138-1145
19. Adams, R.E., and Bukowski, W.M. (2008) 'Peer victimization as a predictor of depression and body mass index in obese and non-obese adolescents', *Journal of Child Psychology and Psychiatry*, 49(8), pp. 858–866
20. Griffiths, L.J., Parsons, T.J. and Hill, A.J. (2010) 'Self-esteem and quality of life in obese children and adolescents: a systematic review', *International Journal of Pediatric Obesity*, 5(4), pp. 282-304
21. Gerlach, G., Herpertz, S. and Loeber, S. (2015) 'Personality traits and obesity: a systematic review', *Obesity Reviews*, 16, pp. 32-63



References

22. Vainik, U. et. al. (2013) 'Neurobehavioural correlates of body mass index and eating behaviours in adults: A systematic review', *Neuroscience and Biobehavioral Reviews*, 37, pp. 279-299
23. Sutin A.R. et. al. (2011) 'Personality and obesity across the adult life span', *Journal of Personality and Social Psychology*, 101(3), pp. 579-592
24. Cheng, H. and Furnham, A. (2013) 'Personality Traits, Education, Physical Exercise, and Childhood Neurological Function as Independent Predictors of Adult Obesity', *PLOS One*, 8(11), e.79586
25. Davis, C. (2009) 'Psychobiological traits in the risk profile for overeating and weight gain', *International Journal of Obesity*, 33, pp. S49–S53
26. Silventoinen, K. et. al. (2010) 'The genetic and environmental influences on childhood obesity: a systematic review of twin and adoption studies', *International Journal of Obesity*, 34, pp. 29-40
27. Rayfield, S. and Plugge, E. (2017) 'Systematic review and meta-analysis of the association between maternal smoking in pregnancy and childhood overweight and obesity', *Journal of Epidemiology and Community Health*, 71(2), pp. 162-173
28. Nan, C. et. al. (2012) 'Heritability of body mass index in pre-adolescence, young adulthood and late adulthood', *European Journal of Epidemiology*, 27(4), pp. 247-253